

# The hemlock looper, *Lambdina fiscellaria* and other threats to Sitka spruce plantations in Europe

Melanie Tuffen, Rachel Wisdom and Sheila Nolan

Wednesday 4<sup>th</sup> September

IPRRG 2019

[melanie@mgtuffen.com](mailto:melanie@mgtuffen.com)



Department of  
**Agriculture,  
Food and the Marine**  
An Roinn  
**Talmhaíochta,  
Bia agus Mara**



**Maynooth  
University**  
National University  
of Ireland Maynooth

# Overview

- Forestry in Ireland
- Sitka spruce pest list
- Plants for planting PRA
- Hemlock looper
- Summary



# Thanks to the RHS!

Current role is Biosecurity coordinator for the Royal Horticultural Society (August 2017 – present) – poster if you are interested in our work!





# Forestry in Ireland

- Forestry in Ireland contributes an estimated €2.3 billion to the economy each year
- Employs between 12 000 and 14 000 people
- Sitka spruce (*Picea sitchensis*) makes up over 50% of the Irish forest estate
- Considered a high priority to identify potential pest threats to Sitka

# The Pest List

- Data was collected on pests of *Picea* globally
- Over 1300 pests and potential pests identified
- For each pest collected data concerning:
  - Distribution
  - Pathways of introduction and spread
  - Impacts

EDITOR'S CHOICE

**Current, emerging and potential pest threats to Sitka spruce plantations and the role of pest risk analysis in preventing new pest introductions to Ireland** 

Melanie G Tuffen , Helen M Grogan

*Forestry: An International Journal of Forest Research*, Volume 92, Issue 1, January 2019,  
Pages 26–41, <https://doi.org/10.1093/forestry/cpy036>

**Published:** 25 October 2018    **Article history** ▼

# Plants for Planting PRA

- One of the project deliverables was a pathway risk analysis
- Risk from pests that could enter on the plants for planting pathway was chosen
- PRA area was the island of Ireland





# Prioritising the Pest List

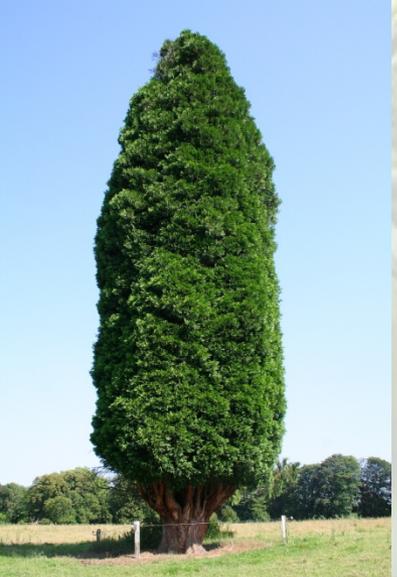
- Did not further consider pests already in the PRA area
- The Plant Health Directive 2000/29/EC prohibits the import of plants of certain conifers from non-European countries
- If the pest was
  - A) only present in non-European countries
  - B) all host plants are prohibitedIt was not considered further



# Plants for Planting PRA

- Over 220 pests were analysed for their risk of introduction to and potential impacts in the PRA area
- Over 100 pests were identified that had non-coniferous plants for planting as a potential pathway of entry

# Plants for Planting PRA



*Calocedrus* (incense cedar),  
*Cephalotaxus* (plum yew), *Cryptomeria*  
(sugi), *Cunninghamia* (China-fir),  
***Cupressus*** (cypress), *Metasequoia*  
(dawn redwood), *Platycladus* (Chinese  
arborvitae), *Pseudolarix* (golden larch),  
*Sequoia* (redwood), *Sequoiadendron*  
(giant sequoia), *Taxodium*, ***Taxus*** (yew),  
*Thuja* (arborvitae), *Thujopsis* (false  
arborvitae) and *Torreya* (nutmeg yew).

# Plants for planting PRA



Damage caused by Sugi scale (*Aspidiotus cryptomeriae*) to fir foliage (left, image courtesy Rayanne Lehman, Pennsylvania Department of Agriculture, Bugwood.org)



Damage to the foliage of hemlock (*Tsuga* sp) by the elongate hemlock scale (*Fiorinia externa*). Image courtesy Eric R. Day, Virginia Polytechnic Institute and State University, Bugwood.org



# Hemlock looper Biology

- *Lambdina fiscellaria* is a North American Lepidoptera defoliator
- Split into three subspecies:
  - *L. fiscellaria fiscellaria* – eastern hemlock looper
  - *L. fiscellaria lugubrosa* – western hemlock looper
  - *L. fiscellaria somniaria* – western oak looper



# Hemlock looper Biology

- No morphological differences between the subspecies
- Some genetic differences between eastern and western subspecies
- Differences between the pheromones
- Main difference: **larval host preference**
- **First instar larvae have a more limited host range and need fresh flushed foliage— later instar larvae can eat pretty much anything!**
- Modelling will assess if bud burst and egg hatch will occur at the same time in Ireland

# Hemlock looper biology

- One generation per year
- Egg is overwintering stage
- Eggs laid on trunks, branches and forest floor  
– **larvae must seek out a host**
- Larvae are wasteful feeders and only eat part of the needle
- As the tree dries up later instar larvae drop to the ground and seek out new hosts
- Pupation occurs in protected places like under bark or hidden in mosses and lichens



# Lifecycle



Original Article

## Report of a rapid pest risk analysis for *Lambdina fiscellaria* (Guenée, [1858]) (Lepidoptera: Geometridae) for the island of Ireland

M. G. Tuffen, R. Wisdom, S. Nolan ✉

First published: 23 July 2019 | <https://doi.org/10.1111/epp.12576>

# Pathways of entry

- Plants for planting
- Cut foliage
- Timber
- **Mosses and lichens**



# Mosses/Lichens



Mosses and lichens cleared from branches in the PNW (Right) and on sale at a plant parts market in Paris, France

**Recent increase in import into the UK – unknown how much is destined for island of Ireland**

# Mosses/Lichens



- There can be between 7 and 76 eggs of hemlock looper in every 100g of lichen (Shore, 1990)
- The UK imported in April and May 2017 (the months eggs hatch) 2.7 tonnes of moss and lichens from the USA
- **In a worst case scenario imports may potentially contain tens of thousands of eggs of hemlock looper**
- Is it treated? How is it stored? Where is it coming from? What is it used for?

# Mosses/Lichens

- What other threats could enter via this pathway?
- *Pissodes strobi* is the most economically important pest of Sitka spruce in North America
- Will overwinter in mosses and lichens

Death of leader due to *Pissodes strobi* (Sitka spruce weevil).

Image credit: Steven Katovich, USDA Forest Service, Bugwood.org



# Hemlock looper - impacts

**Very large economic impacts – low uncertainty**



Outbreaks are periodic but lead to mass mortality and losses of millions of cubic metres of timber  
Conifers are worst affected – oaks and other broadleaved hosts generally recover.



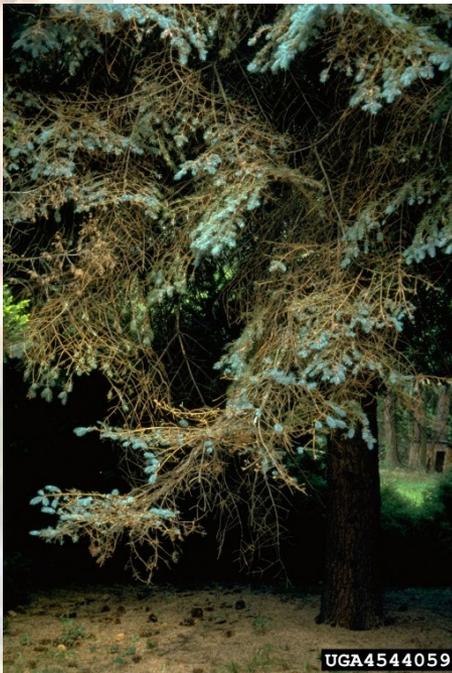
# Potential Impacts

- There are several different factors that may influence potential impacts in the PRA area
- Lack of natural enemies
- Adaption to Irish hosts
- Accumulative impacts with other pests
- Natural spread capacity

# Potential Impacts

- There are several different factors that may influence potential impacts in the PRA area

## Accumulative impacts



Damage from green spruce aphid (left, image credit Petr Kapitola, Central Institute for Supervising and Testing in Agriculture, Bugwood.org) is common in Ireland

# Potential Impacts

- There are several different factors that may influence potential impacts in the PRA area

## Natural spread capacity



Adult western hemlock looper.  
Image credit: Jerald E. Dewey,  
USDA Forest Service,  
Bugwood.org



# Potential economic impacts

- **Moderate with high uncertainty**
- Outbreaks close to site of introduction could be very serious
- Outbreaks not expected in every year
- Should be possible to develop effective monitoring and control measures

# Risk Mitigation

- EU wide threat – Listing in Annex IAI
- Measures needed on:
  - Plants for planting
  - Timber
  - Mosses and lichens



# Conclusions

- Over 1300 pests and potential pests of Sitka spruce have been identified
- Plants for planting present a major pathway of introduction for forest pests
- *Lambdina fiscellaria* is a major North American pest with potential to enter via imported fresh mosses and lichens
- This pathway, as well as import of ornamental conifers also poses a risk of introducing further pests



# Thank you for your attention!



[Edit profile](#)

**Melanie Tuffen**

@M\_G\_Tuffen

Biosecurity coordinator for The RHS. Tweeting about plant health and anything else I feel like! Opinions are my own.

📍 Woking, South East [🌐 mgtuffen.com](https://mgtuffen.com) 🗓️ Born on 2 September 1985

📅 Joined September 2009

**982** Following **889** Followers